Logistics user manual for suppliers of MAN Diesel & Turbo SE

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1 General

Open communication is an essential ingredient of successful partnerships between suppliers and MAN Diesel & Turbo SE. This logistics user manual serves as a sound basis for its ongoing improvement.

1.1 Application areas

This logistics user manual applies to all deliveries to the following MAN Diesel & Turbo SE locations:

1. Berlin, Egellsstr.21, 13507 Berlin
2. Hamburg, Hermann-Blohm-Str. 5, 20457 Hamburg
3. Oberhausen, Steinbrinkstr. 1, 46145 Oberhausen

These plants are referred to as MAN Diesel & Turbo SE in the following.

1.2 Application scope

This logistics manual applies to the locations referred to in 1.1. It does not replace any existing instructions for procedures and operations, nor documents concerning quality and construction. If terms and conditions for points mentioned in this manual have been agreed separately betweeen MAN and a supplier, these individual conditions apply.

1.3 Aims

The aim is to inform suppliers of the requirements and regulations for supplying materials to MAN Diesel & Turbo SE, in order to standardize supplier logisitics, thereby ensuring optimum, rational flow of materials and information.

Furthermore, MAN Diesel & Turbo SE sets the highest standards for the following:

- Environmental compatibility
- Quality assurance
- Occupational health and safety and environmental protection
- Economic efficiency.

1.4 Responsibilities

Suppliers ensure that their packaging systems conform to both the requirements for the products themselves and for the MANDiesel&TurboSE logistics user manual, also to all the currently applicable regulations of national, regional, and local authorities, including the currently applicable local regulations for places where the packaging is disposed of.

They must use sustainable materials for all one-way packaging. These materials must be recyclable. In accordance with EC Directive 94/62/EC, suppliers must avoid generating packaging waste and using unnecessary and/or excessive packaging.

Suppliers are responsible for protecting and packaging products appropriately and according to product requirements, in order to ensure all the items supplied arrive at their destinations safely. If suppliers do not comply with the specifications in the logistics user manual, MAN Diesel & Turbo SE reserves the right to demand that the suppliers either take measures to rectify this, or for MAN to return the goods to the supplier/s.

MAN Diesel & Turbo SE also reserves the right to demand that suppliers cover all the costs resulting from their non-compliance with this logistics user manual, in that they have repackaged, assigned, or disposed of products incorrectly, or allowed them to deteriorate due to unsuitable or soiled packaging, or excessive heavy handling.

1.5 Packaging functions

In general, the packaging should meet the following requirements:

- All the parts should arrive in impeccable, unsoiled condition
- They should be guaranteed secure and easy to handle when being unloaded and transported (e.g. by means of fork lift trucks and cranes)
- Capacity must be used efficiently and loading units formed rationally
- They should be made sufficiently secure during transportation
- Parts should be guaranteed secure and easy to handle when being removed from packaging
- They should be clearly labeled (see Section 8)

- Recyclable materials should be used
- There should be no more than one order item per single package (see Section 2)
- Single packages should contain one type of component only (only one material number per single package)
- If a mixture of parts is unavoidable, the parts should be clearly separated and conveniently organized
- Alternative packaging options (e. g. reusable packages) should be considered
- Inserts or dividers to separate compartments should be used to prevent damage caused by slippage and friction
- Delicate parts should be properly padded

Packaging must fulfill several functions during transportation, storage, and use:

Protective function: Protects from physical and environmental damage, ensures the highest stacks are sufficiently stable.

Loading and transportation: Ensures that the selected transport packages are secure and easy to handle during receipt and storage (usual procedures, such as securing, lifting, moving, setting down, and stowing).

User friendliness: easy to use and safe to handle

Communication: Important transport and shipping details must be attached so that they are visible (see Section 8).

Environmental compatibility: Compliance wiith statutory regulations and using materials that are environmentally compatible, easy to recycle, and dispose of.

Warranty: By delivering an undamaged package, a supplier guarantees that the details on the packaging match the contents.

Rationalization: All the delivery parameters (shipping, shipping route, weight, capacity utilization, also safe handling during loading and unloading, storage, opening, and disposal) must be designed to be efficient.

2 Definitions of terms

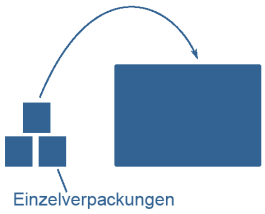
This section contains definitions of the basic terms essential for ensuring correct packaging. Additional terms are described in DIN 55405.

Order item: parts with the same material number

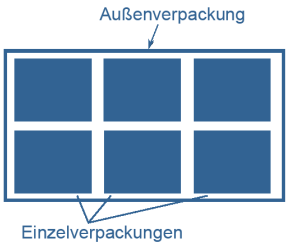
One type only: only parts that contain the same material number

Inner packaging: any packaging touching the goods inside and used to separate and/or make parts secure

Single package: smallest packaging unit. It must contain only one order item (parts with the same material number). A single package should be labeled as specified by MAN Diesel & Turbo SE (see Section 8.2)



Outer packaging: Outer packaging is used for packing several single packages together. An outer package can also be a single package.



Transport packaging: Packaging that enables parts handled safely and easily during transportation. In addition, transport packaging also protects the loaded goods against external influences during transportation, storage, and handling.A transport package can also be an outer package.

Pallet box: Dimensions match those of a Euro-palett (L x W: 1,200 mm x 800 mm)

Auxiliary loading equipment: auxiliary equipment for securing loads, e.g. planks, chains, carriers

Load carriers: Load carriers serve to form rational loading units, e g. pallets

Transport aids: Are used for transport and storage purposes and for heavy and/or unwieldy parts, if these cannot be transported in a standardized packaging system. Possible transport aids are timber or metal transport frames, squared timber frames, casings, or similar.

Strapping: Strapping is used to secure loads during transportation and handling (e.g. to secure loads on pallets)

Safe transport: auxiliary equipment for securing loads during transportation

Stackability: Enables several packages to be stacked on top of the other, without damaging them. Required: flat base and sufficiently stable means of packaging and equipment. All the listed constructions and the quality of the materials must be adapted to the weight of the package contents to ensure safe stacking during transportation and handling. When stacking packages weighing over 30 kg, it should be possible to unload them by means of fork lift trucks or manual lifting trucks e. g. with timber planks between the individual packages. Loading units that cannot be stacked should be labeled accordingly.

Crane use: To be ensured according to the delivery conditions (see Section 9) in compliance with HPE packaging guidelines; it should be possible to use and access cranes for relatively lightweight deliveries.

Overhang: parts that jut out over carrier edges. Lengthwise overhang should be prevented. The maximum permitted overhang over the sides of a pallet is 20 mm per side. Safe transport must be ensured at all times and the center of gravity lie in the center of a pallet.

One-way packaging: is used for single deliveries only

Reusable packaging: is used for more than one delivery

3 Standard packaging

This section shows the standard packages that can be used to ensure items are correctly packed, and their requirements.

3.1 Single packages:

3.1.1 Bags and sacks

Dimensions: must be selected according to volume and weight.

Requirements: The bags and sacks used should be transparent and resealable for easier checking. The quality of the materials must be suitable for the types, requirements, and quantities of the items.A list of approved materials can be found in Section 6.

Use: Bags and sacks can only be used as single packages and their use as separate loads is not permitted; hence they must be placed in additional containers (see Section 3.2) or on load carriers. These types of packages should mainly be used for bulk goods like screws.

Conditions for use: Properties of bags and sacks that are not permitted:

- tears,
- holes, leaks

3.1.2 Packages made of corrugated cardboard and cardboard

Dimensions: according to DIN 55510, see Section 7

Construction: easy to open, stackable

Permitted total weight:

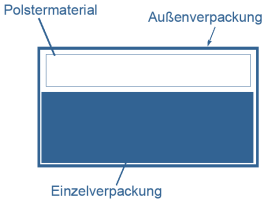
- Boxes (not on pallets) to be loaded: standard weight: 25 kg
- Boxes to be handled manually: standard weight: 25 kg
- Pallet boxes: 1,000 kg

Requirements: According to DIN 55468, any stacking must be guaranteed sufficiently stable and capable of withstanding impact during transportation, handling, and storage. When stacking boxes, wooden runners should be used, in accordance with HPE packaging guidelines, in order to ensure the stacks are sufficiently stable and easy to unload by means of fork lift trucks. In addition, padding must be inserted between the top of the packed goods and the box lids, in order to protect the materials.

Stacking with wooden runners

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Stackability: The boxes must be safe to stack, to ensure they can be loaded rationally. Boxes that cannot be stacked must be labeled as such on the top.



Padding between materials and lid

Use: Corrugated cardboard packages and boxes can be used as either single packages or outer packaging. To prevent the goods being damaged or lost during transportation or handling, the parts must be packed correctly and securely in their boxes.

3.2 Single packages or outer packaging

3.2.1 Packages made of corrugated cardboard and cardboard

For corrugated cardboard packaging and cardboard boxes used as outer packaging, see Section 3.1.2.

3.3 Auxiliary packaging materials

3.3.1 Snap-on pallet boxes, corrugated cardboard

Dimensions: **L x W x H_{max}**:1,200 mm x 800 mm x 1,800 mm; height incl. pallet height

Construction: Euro-pallets, 4-way pallets

Permitted total weight: 1,000 kg

Requirements: According to DIN 55468, any stacking must be guaranteed sufficiently stable and capable of withstanding impact during transportation, handling, and storage.According to the standard and its application, boxes must be made of the following types of corrugated cardboard packaging: 1.10 to 1.50, or 2.20 to 2.70. For sea transport, see Section 3.4.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

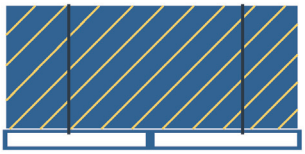
Stackability: Stackability can be enhanced by inserting squared timber battens into the boxes for example. The top must be firm, to ensure the stacking is safe and secure. Non-stackable pallets must be labeled as such on the top.
Use: Snap-on pallet boxes and corrugated cardboard can be used as either single packages or outer packaging.

Strapping/edge protection: see Section 7.3

3.3.2 Shrink film, stretch film, film hood

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm;

Height incl. pallet height



Construction: Euro-pallets, 4-way pallets

permitted total weight: 1,000 kg

Shrink film: To rule out the possibility of the load slipping, when shrinking the film around pallet loads, attach it so that it overlaps the bottom edge of the pallet deck.

Stretch film: only used for lightweight and securely packed goods. Pretensioning should not exceed compressive strength of packed goods. However, less pretensioning means less secure transportation. To rule out the possibility of the load slipping, when wrapping film around pallet loads, attach it so that it overlaps the bottom edge of the pallet deck.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Stackability: Pallets that cannot be stacked must be labeled as such on the top.

Used: for securing one or more single packages on a pallet

Strapping/edge protection: see Section 7.3

3.4 Packaging for air and sea transport

Seaworthy packaging should provide optimum protection against mechanical and physico-chemical damage. This applies not only throughout sea transport and further transport by truck to the construction site, but also to the storage times entailed. A supplier's responsibility for the packaging does not end until the materials are removed from the package.

Stowage height of 8.0 m must be allowed for transportation by conventional ships. Consequently, all the packages must be designed to allow a minimum load on the lid of 1,000 kg/m^2.

A package is subject to stresses along the entire transport route, which can have the following cause, that is, horizontal acceleration during:

- rail transport:
  Shunting impact lengthwise = 4.0*g (g ≈ 9.81 m/s^2)
  Change of direction sideways = 2.0*g
- Truck transport
  Braking = 2.0*g
  Change of direction sideways = 1.5*g
- Sea transport
  Pitch acceleration = 0.6*g
  Roll angle = ± 30°

Materials subject to the German "Carriage of Dangerous Goods by Sea Ordinance", the “IMDG Code” (International Maritime Dangerous Goods Code), and the “IATA RAR Code” (International Air Transport Association - Restricted Articles Regulations) must be packed according to the respective regulations. Waterproof covering material should be used for packaging in corrugated cardboard and cardboard boxes.

Squared timber battens and inserts made of planks or plywood can be inserted, in order to bundle packages weighing up to 2,000 kg. The squared timber battens and inserts are attached and retained securely by machine screws and threaded rods (at least M20) passing through, together with washers. The squared timber battens on the base and top should be at least 0.12 m wide and 0.12 m high. The squared timber battens should be calculated in accordance with DIN 1052. Every single package must be protected against slipping and external influences. The cross-sections for the means of packaging to be used should be calculated in accordance with DIN 1050. Bolts should be used to hold the inserts in position. The spaces between the bolts of a clasp should not exceed

1 m. Bundling with steel belts, wires or cords is not permitted. A package must be sufficiently stable (roll angle for sea transport) and have a supporting area that does not exceed 2,000 kg/m^2. Any marking must only be attached to the package itself, provided this does not impair its further processing. Compatiblility with the specified primer and final coats should be checked, if paint is used. Attachment points, the center of gravity and the transport position should be marked on every package. The attachment points should be selected to prevent ropes slipping and the package being moved horizontally.

4 Standard load carriers

4.1 Euro-pallets

Dimensions: L x W: 1,200 mm x 800 mm

Construction: Euro-pallets according to DIN 15146

Permitted total weight: according to EPAL Pallet system load-bearing capacity, see Section 11

Requirements: A list of approved materials can be found in Section 6.

Stackability: The pallets must be stable when upright and safe and secure when stacked.

Use: When securing loads on a pallet with corrugated cardboard boxes, stacking frames, stretch film, etc, to ensure exchangeability, the exchange criteria for Euro-pallets in the European Pallet Pool (see EPAL Pallet system, sectionl 11) must be fulfilled.

Conditions for use: Properties of non-permitted pallets:

- Damaged or missing components
- Protruding nails and/or screws or comparable defects
- Heavy soiling.

4.2 4-way pallets

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm; height incl. pallet height

Construction: 4-way pallets

Permitted total weight: according to construction

Requirements: A list of approved materials can be found in Section 6.

Stackability: The pallets must be stable when upright and safe and secure when stacked.

Use: 4-way pallets should only be used if no Euro-pallets are available. 4-way pallets cannot be exchanged for Euro-pallets.

Conditions for use: Properties of non-permitted pallets:

- Damaged or missing components
- Protruding nails and/or screws or comparable defects
- Heavy soiling.
- Uneven sides

4.3 Pallet-stacking frames

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm; height incl. Pallet height **construction:**

- ÖBB (Austrian Federal Railways*)* stacking frames
- Folding stacking frames

Permitted total weight: for timber, according to EPAL Pallet system – load-bearing capacity, see Section 11; for plastic or steel according to manufacturer's specifications

Requirements: The stacking frames must be unsoiled and capable of being safely and stably stacked.

Closures: If necessary, the frames can be closed with a lid. Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Stackability: Non-stackable pallets must be labeled as such on the top.

Use: To secure parts and packages to pallets. Packed loads of heavy and/or very large parts must be guaranteed correctly secured, in order to prevent slippage.

Conditions for use: Features of non-permitted stacking frames:

- Faulty functioning of folding frame
- Damaged or missing components
- Protruding nails and/or screws or comparable defects
- Heavy soiling.

4.4 Heavy goods parts on pallets

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm; height incl. pallet height

Construction: For detailed information on pallets, see Sections 4.1 and 4.2

Permitted total weight: for timber, according to EPAL Pallet system – load-bearing capacity, see Section11; for plastic or steel according to manufacturer's specifications

Requirements: Heavy (>30 kg) and/or large parts, which are dispatched directly on pallets (e.g. not in boxes) must be aligned centrally. Packed loads of heavy and/or very large parts must be guaranteed correctly secured, in order to prevent slippage. Use sufficient firm strapping to ensure the load cannot slip.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Strapping/edge protection: see Section 7.3

Stackability: Non-stackable pallets must be labeled as such on the top.

Use: Packaged goods must be placed in the center of pallets and/or the weight evenly distributed. If necessary, a film hood/shrink film/stretch film or pallet boxes should be used to protect the packaged goods. The package must contain one material number only, unless a single package is available.

4.5 Bundles on pallets

Dimensions: L x W: 1,200 mm x 800 mm

Construction: Long parts can be bundled and attached to pallets. The pallets must be suitable for the lengths of the bundles.

The ends of the bundles should be properly protected against damage during transport, storage, and handling. The bundles must be attached securely to the pallets to ensure they can be safely unloaded and handled by fork lift truck or manually. The bundles must be tied to pallets to ensure the packaged goods remain stable while the bundles are being unloaded, handled, and opened.

Permitted total weight: according to EPAL Pallet system – load-bearing capacity, see Section 11

Requirements: Use sufficient, firm strapping to ensure the load cannot slip. Only load carriers which are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Strapping/edge protection: see Section 7.3

Stackability: Construction and material quality must ensure load carriers can be stacked safely during transport and handling, and adapted to the weight of the packaged goods. Bundles that cannot be stacked should be labeled accordingly.

Use: Bundles should comprise one order item only. Delicate parts should be protected by inserts and/or wrapping, to prevent the tops and ends of the parts being damaged.

Conditions for use:

- Safe, stable stacking
- Inherently stable
- Unsoiled

4.6 Wooden boxes on pallets

Before sending parts in wooden boxes, the availability of more efficient packaging which also meets the requirements should be checked.

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm; height incl. pallet height
Construction: according to DIN 55499

Permitted total weight: depends on the construction of the respective box.

Requirements: The packaged goods in wooden boxes must be properly secured against slipping.Likewise, sufficient firm strapping should be used, to ensure the load cannot slip.

Closures: The packaging must be correctly sealed, and safe and easy to open. Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Strapping/edge protection: see Section 7.3

Stackability: Construction and material quality must ensure load carriers can be stacked safely during transport and handling, and adapted to the weight of the packaged goods. Loading units that cannot be stacked should be labeled accordingly.

Use: for permitted materials, see Section 6. Inner packaging serves to protect the packaged goods during transportation, against damage from mechanical stresses, such as impact, shock, or vibration. Stowage facilitators (e.g. bubble wrap or air cushions) can be used to retain the order item, or prevent it from slipping. Stowage facilitators are

made individually, according to any special transport requirements. If a package contains more than one order item, the single packages should be labeled as specified in Section 8. If no single package is available, the components must be labeled with corresponding tags, and appropriately separated from one another.

Conditions for use: Only load carriers which are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.
Features of non-permitted boxes: See conditions for use for pallets in Section 4.1.

4.7 Wooden crates on pallets

The availability of more efficient packaging that also meets the requirements should be checked, before sending parts in wooden crates.

Dimensions: L x W x H_{max}:1,200 mm x 800 mm x 1,800 mm; height incl. pallet height

Construction: according to DIN 55405 or HPE packaging guidelines, open wooden crates must be covered with film, closed crates with plywood, chipboard, or fiberboard.

Permitted total weight: depends on the construction of the respective box.

Requirements: The packaged goods in the wooden crates must be properly protected against slipping. Likewise, sufficient firm strapping should be used, to ensure the load cannot slip. Only containers that are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Strapping/edge protection: see Section 7.3

Stackability: Loading units that cannot be stacked should be labeled accordingly.

Use: Open crates should be covered according to the requirements. Inner packaging serves to protect the packaged goods against damage from mechanical stresses, such as impact, shock, or vibration, during transportation. Stowage facilitators (e.g. bubble wrap or air cushions) can be used to protect the order item and prevent it from slipping.

Stowage facilitators are individually made according to any special transport requirements. If a package contains more than one order item, the single packages should be labeled as specified in Section 8. If no single package is available, the components must be labeled with corresponding tags, and separated from one another appropriately.

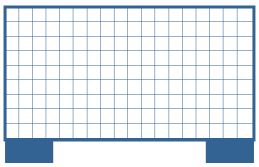
Conditions for use: Only containers that are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted. Features of non-permitted crates and boxes: see conditions for use of pallets in Section 4.1.

4.8 Euro-mesh boxes

Dimensions: L x W:1,200 mm x 800 mm

Construction: Euro-mesh boxes according to DIN 15155

Permitted total weight: according to EPAL Pallet system



For inscription plates, see Section 11

Requirements: Parts must be positioned so as to ensure the weight is evenly distributed. The packaged goods must be properly protected against slipping. The mesh boxes must be correctly positioned to prevent damage. Only containers that are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Stackability: Mesh boxes must be in a condition that allows them to be safely and securely stacked.

Use: If a package contains more than one order item, the single packages should be labeled as specified in Section 8. If no single package is available, the components must be labeled with corresponding tags, and separated from one another appropriately.

Conditions for use: Features of non-permitted mesh boxes:

- Bent, missing or broken components
- Folding front does not open/close
- Missing or non-permitted labeling
- Rust stains and dirt, which can then soil packaged goods

4.9 Wooden boxes

If it is not possible to comply with the load carrier dimensions specified in this Section, suitable constructions must be made for shipping. Before sending parts in wooden boxes, the availability of more efficient packaging, which also meets the requirements, should be checked.

Construction: For goods weighing up to 500 kg, according to DIN 55499, for goods weighing over 500 kg according to the HPE packaging guidelines, in order to ensure wooden boxes are safe and easy to handle when being unloaded by fork lift truck/manually.

Permitted total weight: according to crate construction

Requirements: The packaged goods in wooden boxes must be properly secured against slipping. Likewise, sufficient firm strapping should be used, to ensure the load cannot slip. Only containers that are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.

Strapping/edge protection: see Section 7.3

Closures: The packaging must be correctly sealed, and safe and easy to open. Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Stackability: Construction and material quality must ensure load carriers can be stacked safely during transport and handling, and adapted to the weight of the packaged goods. Boxes that cannot be stacked should be labeled accordingly.

Use: Inserts primarily serve to secure the packaged goods in the boxes, and transfer forces impacting on the lid to the box bases. Inner packaging serves to protect the packaged goods during transportation, against damage from mechanical stresses, such as impact, shock, or vibration. Stowage facilitators (e.g. bubble wrap or air cushions) can be inserted into the boxes to prevent the goods from slipping, and to retain their position. Stowage facilitators are individually made according to any special transport requirements. If a package contains more than one order item, the single packages should be labeled as specified in Section 8. If no single package is available, the components must be labeled with corresponding tags, and separated from one another appropriately. Extra supports should be added to make boxes with large lids more secure.

Conditions for use: Only containers that are unsoiled, can be stacked safely and securely, and remain stable when upright are permitted.
Features of non-permitted crates boxes: See conditions of use in Section 4.1

5 Special packages and special load carriers

If standardized packages (incl. single packages, outer packaging, and transport packages) cannot be used due to special product properties, any packaging should adhere to the basic principles of the logistics user manual and in addition meet the requirements as far as possible. Safe transport for all those involved and the products is paramount, and the packages should be guaranteed easy to handle during loading and unloading.

Transport aids (e.g. casing) must be used to convey heavy and/or unwieldy parts, which cannot be transported in a conventional packaging system. Any dismantled components included in the packaged goods should be tied down or otherwise securely attached to

the packaged goods or transport aids, to ensure all the parts included can be easily and clearly identified and do not get lost.

Construction: Examples of transport aids are timber or metal transport frames, squared timber frames, casings, or similar.The constructions must be sufficiently stable to enable them to be loaded safely. The transport aids should be designed so as to enable the packaged goods to be unloaded and handled by fork lift truck or the specified means of transport. In addition, the transport aids and packaged goods should be properly tied together, to ensure they can be conveyed as a single unit load at all times.

Requirements: These must meet those for heavy goods parts and bundles among others (see Section 4.4 and Section4.5) as regards prevention from slipping and central alignment of the center of gravity. Any blind holes and conducts must be properly closed with covers or plugs. These should be drawn tight to prevent them working loose during transportation, loading and handling. External threads and other protruding parts should be properly protected against physical damage and other external influences.

Closures: Linings/covers must protect the packaged goods from external influences and soiling, to ensure they remain intact.

Strapping/edge protection: see Section 7.3

Stackability: Loading units that cannot be stacked should be labeled accordingly.

Use: Delicate parts should be protected against damage by inserts, coverings, wrapping or similar. Delicate surfaces or protruding parts should be properly secured to prevent them being damaged.

Conditions for use:

- Safe, stable stacking
- Unsoiled

6 Permitted packaging material

6.1 Environmental regulations

To protect the environment on a sustainable basis, the minimum quantity of packaging materials should be used to avoid waste, also recyclable packaging which is easy to recycle.Packaging and packaging materials must be labeled according to DIN 6120 for recycling purposes. Labeling should not reduce their recyclability.

6.2 Approved packaging materials

As a general rule, all one-way packaging should be made of environmentally friendly materials, which are recognized as recyclable in Germany.

Composite packaging materials and loose filling material, such as packaging chips, must not be used.

Paper/cardboard/corrugated cardboard: free of any harmful materials

Plastics:

- One-way packages: PE, PP
- Reusable packages: PE, PP, PS
- Film: PE
- Foam: PE, PP, PS

Timber: Non-impregnated solid wood and plywood.

For deliveries from or to be sent to non-EU countries, the wood must be treated according to IPPC Standard ISPM No. 15. Moreover, all the treated materials must be correctly labeled according to the IPPC standard.

Strapping:

- Delicate packaged goods: PP
- Heavy parts: Metal bands

Closures: Adhesive tapes, packaging tape and adhesive labels and product labels must not reduce the recyclability of the support materials. For using adhesive tapes, see Section 6.2.2 of the ADSp German Freight Forwarding Terms and Conditions.

7 Restrictions, dimensions, variations

7.1 Variations

Only the components listed in Sections 3 and 4 and their dimensions should be used.

When using the entire pallet area, to ensure optimum use of this area, boxes should encompass a multiple of a Euro-pallet (area module), measuring 1,200mmx800mm, so that variations according to DIN30783Partl1, DIN30798Part1,DIN55509, DIN55510, DIN55511 Part 1, DIN55511Part3, DIN55520, DIN 55521 Part1, DIN55521Part2, and DIN55522 (see also **"**Modular adjustment of package sizes" in the technical information of German insurers**,** Section11) can be made. Otherwise pallet boxes measuring 1,200 mm x 800 mm or other suitable pallet packages, measuring 1,200 mm x 800 mm can be used.

7.2 Restrictions

If a package contains several order items, each order item must be packed in a separate single package, **even if they have the same material numbers** (see Section 0).Likewise, all the single packages should contain **one type only**, that is, only one material number. The quantity of items depends on the order.

If an order item contains several material numbers, it should be delivered in an outer package and the purchase order, order item, and material numbers included should be labeled (for more details see Section 10.1).

It must be possible to remove each order item individually when removing the goods, to enable the delivery to be checked against the order. Use **only** bubble wrap and air cushions, also corrugated cardboard, padding, and packing paper to protect them from being damaged or slipping.

7.3 Strapping/edge protection

Unit loads must be secured in accordance with VDI 3968. The packaging is strapped according to requirements, in accordance with DIN EN 13247, DIN EN 13393 or DIN 13394 or according to VDI 3968. The packages must be strapped in correctly. The packaged goods should not be strapped in too tightly or lengthwise, to prevent damage to the packaged goods or pallets. Padding should be used for the corners and sides if at all possible when strapping, in order to prevent the cardboard edges of the boxes being dented or the packaged goods damaged.

8 Labeling

8.1 General labels

The goods, which require special handling, should be labeled in accordance with DIN 55402 and ISO R/780, see also Section 14. The materials and mixtures of materials should be categorized, labeled, and packaged according to Regulation (EC) No. 1272/2008 of the European Parliament and Council (see Section 11). Furthermore, the gross weight of the deliveries must be attached and clearly visible on the transport packaging.

8.2 Order-specific labels

For each order item the goods to be delivered should be listed on a label on the single packages (cardboard boxes, bags and sacks, etc.), alternatively on the goods themselves (tagged, etc., **not** engraved, stamped or the equivalent) and the following information given:

- Order number
- MAN Diesel & Turbo SE order item
- Quantity of packaging unit

- Delivery note ID
- Batch (if available)
- Inspection lot (if available).

Labels that remain unaffected by the preceding labeling are detachable and undetachable labels for order components (for example PSP element, batch, TAG No…), which the order specifically requires. If an order item comprises several individual parts (loose parts with no separate order items), these should be labeled as follows:

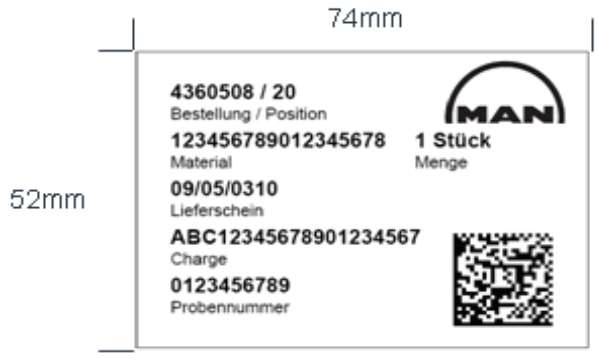
- Order item number of the list of accessories on the delivery note
- Summary of materials (names)
- Delivery quantity

In addition, transport packages containing different order items must be labeled as follows: “mixed package”. Incorrectly labeled parts will either be returned at the supplier’s expense or the supplier will be required to identify them at our goods reception area.

8.2.1 Label specifications

The dispatched goods should be labeled as follows:

- Labels should be attached to every single package;
- Labels enable the delivered goods to be clearly identifiable;
- The 2D data matrix code enables optimized processing of the available data and information;



- The 2D data matrix code enables optimized processing of the available data and information;
- Minimum size 74 x 52 (W x H in mm);

→according to DIN A8;

- Minimum font sizes:
  →10 pt for data
  →08 pt group 6/VI (Arial, Helvetica, etc.) must be used for field label fonts, in accordance with DIN 16518;
- The 2D barcodes must be guaranteed readable, by allowing a minimum space of of 0.5 mm in all directions between these and other document elements or label edges;
- The logo should not exceed one quarter (25%) of the total label or reduce its readability;
- The print quality of the labels should be guaranteed;
- The usual printing processes should be selected (laser, thermal direct or thermal transfer printing);
- Labels should contain the following data elements in clear fonts:
  →MAN purchase order and order item
  →Quantity in the single package
  →MAN Diesel & Turbo SE material number
  →Delivery note, delivery note ID or delivery of suppliers
  →Batch number for materials requiring batch processing
  →Sample number or materials requiring batch processing;
- The data (apart from MAN material) shown in a plain font should be shown as follows in a data matrix code according to ECC200 and with a minimum edge length of 15 mm;
  →4360508&20&1&09/05/0310&ABC12345678901234567&0123456789
  →Purchase order&order item&quantity&delivery note&batch&sample number
- Labels must always be suitable for transport as far as MAN Diesel & Turbo SE;
- Adhesive labels are to be preferred.

8.3 Transport documents

A delivery note, which can include an order number and be assigned to a delivery note number, must be prepared for each order. The following information must be shown on the delivery note of each order item:

- Order item
- MAN Diesel & Turbo SE material number
- Summary of materials (names)
- Delivery quantity
- Required special label (batch, TAG no. PSP element, etc.).

Important! **Only** the goods included in the delivery can be listed on the delivery note. The delivery note must include a data matrix code according to the specifications in 8.3.1.

If an order item comprises several individual parts (loose parts with no separate order items), these should be listed separately on the delivery note under the respective order item, including the order item number, identification, and quantity.

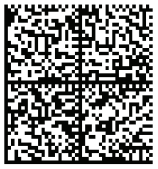
If several order items are delivered assembled together, all the delivered order items should still be listed separately on the delivery note. Furthermore, a note should be included on the delivery note next to the relevant order items (example: “Order item 10 assembled with 30”).

Delivery notes and relevant documents (e.g. certificates, measuring protocols) must be attached to the transport packaging in a document pocket, so as to be clearly visible and accessible.

The delivery note must ensure the goods can easily be assigned to the above information. Unclear combinations of goods and delivery notes will either be returned at the supplier’s expense or the supplier will be required to identify them at our goods reception area. Delivery notes should be labeled as described in 8.3.1 in order to be clearly identified.

8.3.1 Delivery note label specifications

- 2D code supports fast, error-free recording of deliveries.
- 2D code can be printed on either the delivery note or the label attached to the note.
- All the relevant data are added for identification purposes.



09/05/0310
Lieferschein

- The same requirements as those for single package labels apply to the 2D data matrix delivery note code, in the following areas (see 8.2.2):

  →Font
  →Printing process
  →General requirements
  →Separation

- The following data elements must be listed under the data matrix code in clear fonts:

  →Delivery note, delivery note ID, or delivery of suppliers;

- Modules of 0.025 ins/0.635 mm min. must be adhered to (this determines the data matrix code length);
- The data matrix code groups all the supplier's details into one data element;
- The individual data elements are listed next to one another in a line, each separated by a double separator (&&), according to the individual label specifications;
- The character string is repeated for each order item of MAN DT;

  →4360508&20&1&09/05/0310&ABC12345678901234567&0123456789&&;
  →Purchase order&orderitem&quantity&delivery note&batch&sample number&&.

9 Delivery conditions

9.1 General

A transport drawing must be made available when transporting heavy goods (>20 t, >12 x 2.4 x 2.4 m).

Bills of lading must be in English or German and include the following information:

- Type of package (box, crate, bundle)
- Number of packages
- Order number

In addition, the goods intended for MAN Diesel & Turbo SE must be clearly labeled with the company code and address. Goods not intended for MAN Diesel & Turbo SE will not be handled. Moreover, the company can refuse to unload them for reasons of safety.

Damaged or incorrect deliveries, or a breach of the above conditions can result in a refusal to receive them. In this event, they will be photographed and the relevant form handed to the driver.

The StVO (German Road Traffic Act) applies on MAN Diesel & Turbo SE plant premises. Additional safety precautions of the local organizations should be adhered to.

9.2 Berlin plant

When delivering to the Berlin plant, please note that there is no loading ramp there.

The plant should always be notified about special transports.

The use of cranes (as in merely using a rope is necessary), access to and unloading by crane must be ensured for the following goods: >12,000 kg.

Goods reception is open between 06:30 and 18:30. The plant should be notified of any exceptions in advance

9.3 Hamburg plant

When delivering to the Hamburg plant, please note that there is no loading ramp there.

Those responsible for transport should always notify the plant in advance about the following goods: gross weight over 45,000 kg and/or measuring (H x W) more than 5,000 x 6,000 mm, including the height of the transport vehicle.The plant should always be notified about special transports.

The use of cranes (as in merely using a rope is necessary), access to and unloading by crane must be possible for the following goods: >2,500 kg.

Goods reception is open between 07:00 and 14:45. The plant should be notified of any exceptions in advance

9.4 Oberhausen plant

When delivering to the Oberhausen plant, please note that there is no loading ramp there.

Those responsible for transport should always notify the plant in advance about the following goods: Gross weight over 60,000 kg and/or a total height of 4,200 mm. The plant should always be notified about special transports.

The use of cranes (as in merely using a rope is necessary), access to and unloading by crane must be possible for the following goods: >4,000 kg.

Goods reception is open between 06:30 and 17:30. The plant should be notified of any exceptions in advance

10 Frequently occurring problems:

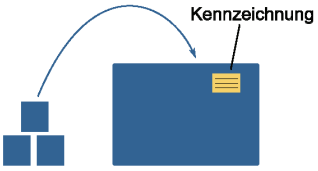
This section deals with frequent packaging problems, and contains descriptions of suggestions as to how these can be avoided and the situation improved. Such cases significantly increase the number of errors and the costs incurred by both MAN and its suppliers for the work entailed in solving them.

10.1 Ordering different material numbers

10.1.1 Case 1

The order is for an MAN order item which is made up of three material numbers. Current version: The delivery is made up of three single packages.

Solution: According to the logistics user manual the goods should be delivered (sorted according to order item) in outer packaging, see illustration. The goods should be labeled according to Section 8 and the delivery note attached to the outer packaging in a document pocket.

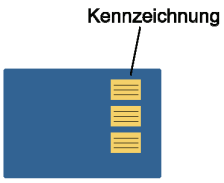


required condition of delivery

10.1.2 Case 2

The order is for three MAN order items which are managed under one material number at the supplier's. Current version: The delivery comprises a single package only.

Solution: According to the logistics user manual the goods (one type of component only) should be delivered in outer packaging. The different MAN order items should be labeled separately on the outer packaging. In this case the delivery note must include the details, "order items x, y, z included".



required condition of delivery

10.2 Different order items in a single package

Different order items are frequently delivered together in a single package because they all have the same material number. However, these should be packed, **sorted into order items**, that is, separated from one another.

Example:

Purchase order 123456 comprises the following:

Order item10: Material number111111111, 50 pieces
Order item 20: Material number 111111111, 50 pieces

Current version: A single package for material number 111111111 contains 100 pieces.

Solution: According to the logistics manual 2 x 50 pieces should be delivered in separate single packages, labeled according to Section 8, and assembled into a transport package.

10.3 Partial deliveries

With partial deliveries, the contents of an entire order are often listed on the delivery note. However, the note should include only the order items that are actually delivered.

Example:

Purchase order 123456 comprises the following:

Order item 10: Material number 222222222, 50 pieces
Order item 20: Material number 333333333, 20 pieces
Order item 30: Material number 444444444, 15 pieces

Current version: Material number 333333333, 20 pieces with delivery note listing all three order items of the purchase order.

Solution: According to the logistics user manual the delivery note should only contain the required information (see Section 8.2) about the delivered goods (material number 333333333, 20pieces).

11 References to standards and guidelines

All packaging and logistics processing must be designed to comply with the currently applicable DIN standards and/or comparable guidelines. The relevant standards and guidelines are listed and summarized as follows:

ADSp: Allgemeine Deutsche Spediteurbedingungen (German Freight Forwarders' Standard Terms and Conditions)

DIN 436: Washers, squared, timber

DIN 440: Washers, round, timber

DIN 571: Hexagon timber screws

DIN 601: Hexagon timber screws

DIN 603: Flat, round screws

DIN 1050: Structural steel

DIN 1052: Timber structures

DIN 1151: round wire pins

DIN 6120: Marking of packaging and packaging materials for *recycling* purposes - Plastics packaging and packaging materials

DIN EN 13199: Packaging – small load carrier systems

DIN EN 13247: Specifications for steel straps for lifting, tying, and securing loads

DIN EN 13393: Specifications of edge protection angles

DIN 13394: Specifications of non-metal straps

DIN 15146: Four-way, flat timber pallets

DIN 15155: Euro-mesh boxes

DIN 30783: Modular order in the transport chain, coordination at horizontal level, terms and basic principles

DIN 30798: Modular systems; modular order, terms

DIN 55402: Marking for shipping

DIN 55405: Terms for packaging system

DIN 55468: Goods and testing requirements for corrugated cardboard

DIN 55473: Dessicant in bags and sacks

DIN 55499: Basic structures of solid wood boxes up to 500 kg

DIN 55509: Storage areas in packaging system; terms

DIN 55510: Packaging; modular coodination in packaging system, modular sub-multiples of an area module, measuring 600 mm x 400 mm

DIN 55511 Part 1: Means of packaging; boxes made of solid or corrugated cardboard, with dimensions to fit 600 mm x 400 mm (area modules); folding boxes with closing flaps on base and lid

DIN 55511 Part 3: Means of packaging; boxes made of solid or corrugated cardboard, with dimensions to fit 600 mm x 400 mm (area module); snap-lid boxes

DIN 55520: Storage areas for shipping packages, based on storage areas, measuring 800 mm x ,1200 mm and 1,000 mm x 1,200 mm

DIN 55521 Part 1: Means of packaging; boxes made of solid or corrugated cardboard, with dimensions to fit 800 mm x 1,200 mm and 1,000 mm x 1,200 mm (storage area); folding boxes with closing flaps on base and lid

DIN 55521 Part 2: Means of packaging; boxes made of solid or corrugated cardboard, with dimensions to fit 800 mm x 1,200 mm and 1,000 mm x 1,200 mm (storage area); snap-lid boxes

DIN 55522: Means of packaging; cardboard boxes, folding boxes with tuck-in bases and lids, defining box dimensions

EPAL Pallet system – inscription

http://www.epal-pallets.de/de/produkte/aufschriftentafel.php

EPAL Pallet system – exchange criteria:

http://www.epal-pallets.de/de/produkte/tauschkriterien.php

EPAL Pallet system – load-bearing capacity:

http://www.epal-pallets.de/de/produkte/tragfaehigkeit.php

IATA RAR code: International Air Transport Association - Restricted Articles Regulations

IMDG code: International Maritime Code for Dangerous Goods

IPPC-Standard ISPM No. 15: IPCC international standards for phytosanitary measures for packaging materials made of solid wood in international trade.

ISO R/780: Symbols for information on handling packages

Modular adjustment of package sizes in the technical information of German insurers:

http://www.tis-gdv.de/tis/verpack/normung/normung.htm#m38

VDI 3968: Securing load units

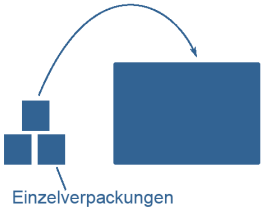
Regulation (EC) No. 1272/2008 of the European Parliament and Council Categorization, labeling, and packaging of materials and mixtures of materials

12 List of abbreviations

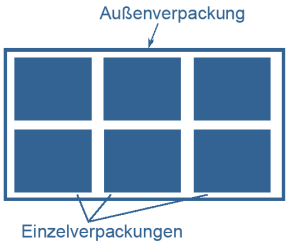
W	width
e.g.	that is
DIN	Deutsche Industrienorm ("German institute for standardization")
EN	European standards
etc.	et cetera
EU	European Union
g	gravity acceleration
ggf.	gegebenenfalls (if necessary)
H_{max}	maximum height
IATA RAR Code	International Air Transport Association - Restricted Articles Regulations
IMDG Code	International Maritime Code for Dangerous Goods
incl.	including
IPPC	Integrated Pollution and Control
ISO	International Organization for Standardization
IPSM	International Standards for Phytosanitary Measures
kg	kilogram
KLT	small load carrier

L	length
MAN	Maschinenfabrik Augsburg-Nürnberg
m	meter
mm	millimeter
No.	number
o. Ä.	oder Ähnlichem (or similar/the equivalent)
ÖBB	Österreichische Bundesbahn (Austrian Federal Railways)
PE	polyethylene
PP	poylypropylene
PS	polystyrol
PSP	Project Structure Plan
s	second
SE	European Society
st.	road/street
t	tonne (metric ton = 2,000 pounds), ton (Imperial ton = 2,240 pounds)
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
e. g.	for example

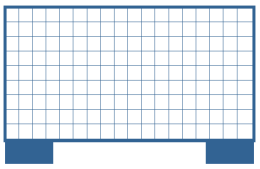
13 Explanations of symbols



Single package

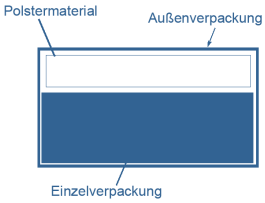


Outer packaging



Euro-mesh boxes

Stacking with wooden runners

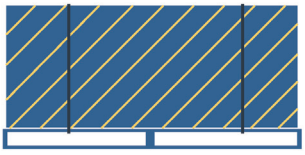


Padding between materials and lid

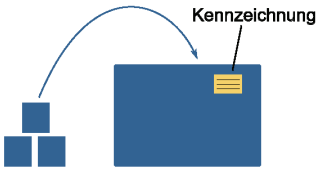
Corrugated cardboard /boxes on pallets, with strapping

Heavy part on pallet with strapping

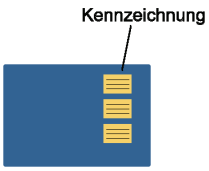
Bundle on pallet with strapping



Packaged goods with film, strapped to pallet



Required delivery condition in Section 10.1.1



Required delivery condition in Section0

14 Handling symbols

Zerbrechliches Packgut
Fragile, Handle with care

Keine Handhaken verwenden
Use no hooks

Oben
This way up

Vor Hitze (Sonneneinstrahlung) schützen
Keep away from heat

Anschlagen hier
Sling here

Vor Nässe schützen
Keep dry

Schwerpunkt
Center of gravity

Stechkarre hier nicht ansetzen
No hand truck here

Zulässige Stapellast
Stacking limitation

Klammern in Pfeilrichtung
Clamp here

Zulässiger Temperaturbereich
Temperature limitations

Gabelstapler hier nicht ansetzen
Do not use fork lift truck here

Elektrostatisch gefährdetes Bauelement
Electrostatic sensitive device

Sperrschicht nicht beschädigen
Do not destroy barrier

Aufreißen hier
Tear off here

15 Concluding statement

By signing here, I confirm that I have read and understood all the information and terms and conditions.

I accept the logistics user manual
(Please mark with a cross accordingly)

☐ have no comments.

☐ with the following comments:

Point:	Comment:

Place, date

supplier's signature + stamp